

**REMARKS**

Claims 1-19 are pending in the application.

Claims 1 and 10 have been amended in order to more particularly point out, and distinctly claim the subject matter to which the Applicants regard as their invention. It is believed that this Amendment is fully responsive to the Office Action dated **June 3, 2002**.

**Claim Rejections under 35 USC §102**

Claims 1 and 9 are rejected under 35 USC §102(e) as being anticipated by Kawai.

The outstanding Office Action points out that Fig. 8 of Kawai discloses a semiconductor light emitting device including a cladding layer 28 having a ridge portion formed on a flat portion. While the outstanding Office Action recognizes the projecting portion on the center of the cladding layer 28 as the ridge portion, it should be noted that only the region of the GaN contact layer 31 is not subjected to ion implantation of boron projects. The projecting portion as well as the regions located on both sides thereof are composed of AlGaIn of the same composition ratio but with different boron concentrations, as understood from Figs. 6 and 7 and the description thereof. It is believed that such a projecting region composed of the same material as the regions located on both sides thereof but with different impurity concentrations is not referred to as a ridge portion in Kawai. Accordingly, independent claim 1 is amended to particularly distinguish the above-mentioned characteristics of Kawai.

According to the present invention, the semiconductor laser device comprises the current blocking layer having a larger Al composition ratio than the ridge portion provided on the side surfaces of the ridge portion thereby making a difference in transverse refractive index and improving transverse optical confinement, and the current blocking layer having a larger Al composition ratio is set to a high resistance thereby reducing the parasitic capacitance in the vicinity of the interface between the current blocking layer and the cladding layer, thus improving the response characteristics in pulse driving.

Independent claim 1, as newly amended, is shown hereinbelow for the convenience of the Office:

“1. (Amended) A semiconductor light emitting device comprising:  
an active layer composed of a nitride based semiconductor;  
a cladding layer formed on said active layer, composed of a nitride based semiconductor of a first conductivity type, and having a flat portion and a ridge portion formed on the flat portion; and  
a first current blocking layer formed on said flat portion and on sidewalls of said ridge portion of said cladding layer and composed of a high-resistive nitride based semiconductor containing impurities;  
wherein the cladding layer is composed of AlGaIn; and  
wherein the first current blocking layer is composed of AlGaIn having a larger Al composition ratio than that of the cladding layer.”

This claim is fully supported by way of an example in Figure 1 and associated written description, wherein there is indeed disclosed a semiconductor light emitting device comprising an active layer 72 composed of a nitride based semiconductor; a cladding layer 8 formed on said active layer 72, composed of a nitride based semiconductor of a first conductivity type, and having a flat portion 82 and a ridge portion 10 formed on the flat portion 82; and a first current blocking layer 12

formed on said flat portion 82 and on sidewalls of said ridge portion 10 of said cladding layer 8 and composed of a high-resistive nitride based semiconductor containing impurities; wherein the cladding layer is composed of AlGa<sub>N</sub> (p. 10, lines 10-24); and wherein the first current blocking layer is composed of AlGa<sub>N</sub> having a larger Al composition ratio than that of the cladding layer (p. 10-11).

It is well settled that:

"A claim is anticipated only if each and every element *as set forth in the claim* is found, either expressly or inherently described, in a single prior art reference." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1567, 7 USPQ2d 1057 (Fed. Cir. 1988)."

Should the Office continue to believe that independent claim 1, as amended, is anticipated by the asserted prior art, a citation of where each and every claimed feature, either as column number and line number, or figure number and reference numeral, or a combination thereof, as disclosed in the asserted prior art is respectfully requested. Should the Office determine that any claimed feature is not disclosed in the asserted prior art, it is respectfully submitted that the claimed invention is not anticipated by the asserted prior art. Allowance of the claimed invention is then respectfully requested.

**Claim Rejections under 35 USC §103**

**Claim 2 is rejected under 35 USC §103(a) as being unpatentable over Kawai in view of Okazaki et al. (U.S. Patent No. 5,966,396).**

**Claims 3, 5 and 6 are rejected under 35 USC §103(a) as being unpatentable over Kawai in view of Johnston, Jr. et al. (U.S. Patent No. 4,888,624).**

**Claim 4 is rejected under 35 USC §103(a) as being unpatentable over Kawai in view of Adachi et al.**

**Claims 7 and 8 are rejected under 35 USC §103(a) as being unpatentable over Kawai in view of Hiroyama et al.**

Independent claim 1, as newly amended, patentably distinguishes over Kawai. All claims dependent thereon, by virtue of inherency, also patentably distinguish over Kawai further in view of whatever other reference.

Reconsideration and withdrawal of these rejections are respectfully requested.

**Claims 1, 2, 9-12 and 19 are rejected under 35 USC §103(a) as being unpatentable over Hirata in view of Okazaki.**

The outstanding Office Action alleges that Hirata discloses a semiconductor laser device comprising a cladding layer 4 having a flat portion and a ridge portion formed on the flat portion and a current blocking layer 8 formed on the flat portion of the cladding layer and the sidewalls of the ridge portion. However, in the semiconductor laser device according to Hirata, the cladding layer

4 is composed of AlGaInP and the current blocking layer 8 is composed of GaAs, which is obviously different in material structure from the semiconductor laser device according to the present invention, where the cladding layer is composed of AlGaN and the first current blocking layer is composed of AlGaN and having a larger Al composition ratio than the cladding layer.

The outstanding Office Action also alleges that Okazaki et al. discloses a semiconductor laser device comprising a current blocking layer of a high resistance doped with Zn. However, in the semiconductor laser device according to Okazaki et al., the current blocking layer is formed on both sides of the active layer and the cladding layer.

In the semiconductor laser device according to Okazaki et al., the interface between the current blocking layer and the active layer or the cladding layer is so small that the parasitic capacitance in the vicinity of the interface cannot be reduced and the response characteristics impulse driving cannot be improved, despite the high resistance of the current blocking layer.

While the Examiner rejects claims 1 and 10 of the present invention by combining Hirata with Okazaki et al., such combination of Hirata and Okazaki et al., teaches a set of very different semiconductor laser devices having completely different materials and structures.

Even if the semiconductor laser device according to Hirata is modified with a nitride-based semiconductor layer in view of Okazaki et al. and the current blocking layer is doped with impurity ions, this modification cannot reach the inventive semiconductor laser device comprising the cladding layer composed of AlGaN and the first current blocking layer composed of AlGaN having

a larger Al composition ratio than the cladding layer. Therefore, the present invention is not rendered obvious by the asserted prior art.

To advance the prosecution of this application, claims 1 and 10 are amended. The discussion of independent claim 1, as mentioned in response to a previous rejection, is incorporated herein by reference without redundant duplication.

Independent claim 10, as newly amended, is shown hereinbelow for the convenience of the Office:

“10. (Amended) A semiconductor light emitting device comprising:  
an active layer composed of a nitride based semiconductor;  
a cladding layer formed on said active layer, composed of a nitride based semiconductor of a first conductivity type, and having a flat portion and a ridge portion formed on the flat portion, said cladding layer having a recess on said flat portion along both sidewalls of said ridge portion; and  
a first current blocking layer formed on said flat portion and on the sidewalls of said ridge portion such that it is embedded in said recess of said cladding layer;  
wherein the cladding layer is composed of AlGaIn; and  
wherein the first current blocking layer is composed of AlGaIn having a larger Al composition ratio than that of the cladding layer.”

Independent claim 10 is supported by way of an example in Figure 4 and associated written description, wherein there is indeed disclosed a semiconductor light emitting device comprising an active layer 72 composed of a nitride based semiconductor; a cladding layer 108 formed on said active layer 72 composed of a nitride based semiconductor of a first conductivity type, and having a flat portion 182 and a ridge portion 10 formed on the flat portion 182, said cladding layer 108 having a recess 183 on said flat portion 182 along both sidewalls of said ridge portion 10; and a first current blocking layer 112 formed on said flat portion 182 and on the sidewalls of said ridge portion

10 such that it is embedded in said recess 183 of said cladding layer 108; wherein the cladding layer is composed of AlGa<sub>N</sub> (p. 13); and wherein the first current blocking layer is composed of AlGa<sub>N</sub> having a larger Al composition ratio than that of the cladding layer (p. 13).

Section 2143 of the MPEP has specifically stated that:

“To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claimed limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 466, 20 USPQ2d 1438 (Fed. Cir. 1991).”

Therefore, it is both a court position and a Patent Office position that to establish a *prima facie* case of obviousness, 1) there **must be** some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; 2) there **must be** a reasonable expectation of success; and 3) the teaching or suggestion to make the claimed combination and the reasonable expectation of success **must both be** found in the prior art, and not based on applicant’s disclosure.

Therefore, should the Office either be unable to identify each and every aspect of the above-mentioned claimed features after taking full consideration of the asserted prior art in a way exactly applied in the outstanding Office Action, or the Office recognizes that the rejection simply does not arise to a level objectively fulfilling all three criteria of establishing a *prima facie* case of

obviousness, it is respectfully submitted that the obviousness rejection is defective and allowance of the claimed invention is requested.

**Claims 3, 5 and 6 are rejected under 35 USC §103(a) as being unpatentable over Hirata in view of Okazaki as applied to claim 1 and further in view of Johnston.**

**Claim 4 is rejected under 35 USC §103(a) as being unpatentable over Hirata in view of Okazaki as applied to claim 1 and further in view of Adachi.**

**Claims 7 and 8 are rejected under 35 USC §103(a) as being unpatentable over Hirata in view of Okazaki as applied to claim 1 and further in view of Hiroyama et al.**

**Claims 13, 15 and 16 are rejected under 35 USC §103(a) as being unpatentable over Hirata in view of Okazaki as applied to claim 10 and further in view of Johnston.**

**Claim 4 is rejected under 35 USC §103(a) as being unpatentable over Hirata in view of Okazaki as applied to claim 10 and further in view of Adachi.**

**Claims 17 and 18 are rejected under 35 USC §103(a) as being unpatentable over Hirata in view of Okazaki as applied to claim 10 and further in view of Hiroyama et al.**

Independent claims 1 and 10, as newly amended, patentably distinguish over Hirata in view of Okazaki. All claims dependent thereon, by virtue of inherency, also patentably distinguish over Hirata in view of Okazaki further in view of whatever other reference.

Reconsideration and withdrawal of these rejections are respectfully requested.



**Conclusion**

In view of the aforementioned amendments and accompanying remarks, claims 1 and 10, as amended, are in condition for allowance, which action, at an early date, is requested.

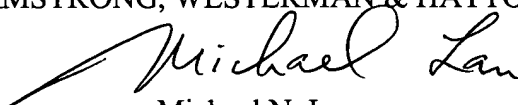
If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

Enclosures: Version with markings to show changes made

**IN THE CLAIMS:**

Please amend claims 1 and 10 as follows:

1. (Amended) A semiconductor light emitting device comprising:
  - an active layer composed of a nitride based semiconductor;
  - a cladding layer formed on said active layer, composed of a nitride based semiconductor of a first conductivity type, and having a flat portion and a ridge portion formed on the flat portion; and
  - a first current blocking layer formed on said flat portion and on sidewalls of said ridge portion of said cladding layer and composed of a high-resistive nitride based semiconductor containing impurities;
  - wherein the cladding layer is composed of AlGaIn; and
  - wherein the first current blocking layer is composed of AlGaIn having a larger Al composition ratio than that of the cladding layer.
  
10. (Amended) A semiconductor light emitting device comprising:
  - an active layer composed of a nitride based semiconductor;
  - a cladding layer formed on said active layer, composed of a nitride based semiconductor of a first conductivity type, and having a flat portion and a ridge portion formed on the flat portion, said cladding layer having a recess on said flat portion along both sidewalls of said ridge portion; and

a first current blocking layer formed on said flat portion and on the sidewalls of said ridge portion such that it is embedded in said recess of said cladding layer;

wherein the cladding layer is composed of AlGa<sub>N</sub>; and

wherein the first current blocking layer is composed of AlGa<sub>N</sub> having a larger Al composition ratio than that of the cladding layer.